

Appl. No. 09/721,233
Amdt. Dated October 21, 2003
Reply to Office Action of July 21, 2003

REMARKS/ARGUMENTS

Claims 1 and 13 have been rejected under 35 U.S.C. Section 103 as unpatentable over Williams, U.S. Patent Number 5,850,548 in view of Vassallo, U.S. Patent Number 6,157,194. Claims 7 – 10 and 17 – 19 have been rejected in view of the above-cited references in combination with McDonald, U.S. Patent Number 6,053,951. In response, claims 1 and 13 have been amended to incorporate the limitations formerly found in claims 6, 7, and 17, and new claims 20 – 21 have been added. Reconsideration of the rejection of claims 1 and 13, along with the associated dependent claims, and consideration of new claims 20 – 21 is respectfully requested.

The present invention is a medical imaging system which includes a visual application development system for developing medical imaging scan processes. The applications are developed visually by a user who selectively links components to form medical imaging scan applications which can be, for example, various types of pulse sequences and medical studies (see, for example, page 10 of the application as filed). As recited in claims 1 and 13, as amended, the visual development system includes a component library which includes components which define medical imaging scan parameters as, for example, gradient, RF and control pulses. (See page 15 of the specification as filed). These components allow a user of the medical imaging system to easily construct and edit medical imaging scans. During development, the user can visualize, for example, the pulse sequence to be executed by the medical imaging scan.

Vassallo discloses an MRI control system employed on a personal computer system, and configured to control MRI system hardware directly. The personal

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computer includes a device driver for driving MRI hardware which abstracts parameters from the specific MRI hardware used to adjust the control parameters. Although providing a brief suggestion that a pulse waveform could be "drawn" by a user, without any teaching or suggestion of how this could be done, this reference does not teach or suggest any method of visual development. Moreover, this reference neither teaches nor suggests the use of components, or libraries of components, for medical imaging scans.

Williams discloses a computer system with a visual development environment for a computer. The visual development environment includes an interface having a component inspector, component manager, component library, and one or more visual editors. In operation, a user constructs a program by selecting one or more components from the library, which displays the components. Using a visual editor of the system, the user may modify the logic of individual components, connect the components via component ports, and nest components within other components to an arbitrary level. Williams does not suggest medical imaging, providing components for medical imaging, the use the visual development system for developing a real-time control program for use in medical imaging, or any method of producing a waveform.

McDonald discloses a man/machine interface (MMI) graphical code generation wizard. The wizard associates a front panel control/indicator with a tag for monitoring a control loop. Among the front panel controls are waveform chart indicators which can be used to monitor a real-time trend (see column 23 lines 5 -- 25). The Wizard, therefore, allows a user to set up a real-time waveform monitoring

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process. McDonald neither teaches or suggests a method for producing a waveform during application development.

In the office action, it is asserted that it would have been obvious to have used a waveform object to track real time change in a system. The waveform plotter provided in the present invention, however, does not merely track real time changes as disclosed by McDonald. Rather, the waveform is visualized during development of an application which is to be provided on a medical imaging system.

None of the cited references teach or suggests a method for visualizing a pulse sequence waveform for execution on hardware during application development. McDonald, rather, discloses a method for graphically monitoring a control device during operation. The waveform is not intended to be executed by the system, but monitored by the system. Vassallo does not suggest a visual development system in which components can be assembled and the results viewed graphically, but rather "drawing" a waveform directly as part of the programming process, an extremely difficult and inexact process, and one which is not suited to the exactness required for medical imaging scans. Williams discloses no method for displaying a waveform.

None of the prior art references therefore teach or suggest a visual development system for medical imaging which provides a simple method for assembling a waveform from components and then viewing the waveform to be performed on medical imaging hardware. The system of the present invention, moreover, is important in that it provides a substantial advantage to users of a medical imaging system by allowing the user to quickly and easily change the parameters of a scan and, furthermore, to visualize the results of these changes. None of the cited

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prior art references teach or suggest such a system. The applicants, therefore, respectfully submit that the invention as recited in claims 1 and 13 and associated dependent claims 2 - 5, 8 - 12, 14 - 16, and 18 - 21 are distinguished over the prior art, and respectfully request that the rejection of these claims be withdrawn.

Claim 13 further recites visually forming an object-oriented application program which includes at least one of a pulse description, a sequence description, an acquisition description, a data processing description, and a data store description. The application program therefore includes a complete description for executing, acquiring, and reconstructing an image, which can be compiled visually and easily transmitted to medical imaging hardware, or to other workstations, particularly where, as recited in claims 20 and 21, the application is provided in Java objects which can be transmitted to another virtual Java machine easily and also translated to a faster executable language such as C or C++ for execution on medical imaging hardware.

None of the cited references teach or suggest a method for visually developing a complete, transportable medical imaging scan. Furthermore, as described above, none of the cited references disclose any method of visualizing such a scan as a waveform during development. In view of these distinctions, the Applicants respectfully request that claim 13 is patentably distinct over the cited references, and respectfully request that claims 13 and associated dependent claims be allowed.

Conclusion

In view of the foregoing amendments and arguments, the Applicants submit that the present invention is in condition for allowance, and respectfully request that a notice of allowance for claims 1 - 5, 8 - 16, and 18 - 21 be issued.

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No fee is believed necessary. However, if a fee is required please charge it to
Deposit Account 17-0055.

Respectfully submitted,

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By:  10/21/03

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